Stormwater TMDL for the Benthic Impairment in the Accotink Creek Watershed

Assessment of the Proposed Technical Approaches

Public Meeting

Fairfax County Government Center

Fairfax, Virginia

September 29th, 2009

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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Agenda

1. Review of the Benthic Impairment, Stressor Identification, and Urbanization
2. Technical Approach
3. Conclusions
4. Questions

DEQ
Virginia Department of Environmental Quality

United States Environmental Protection Agency

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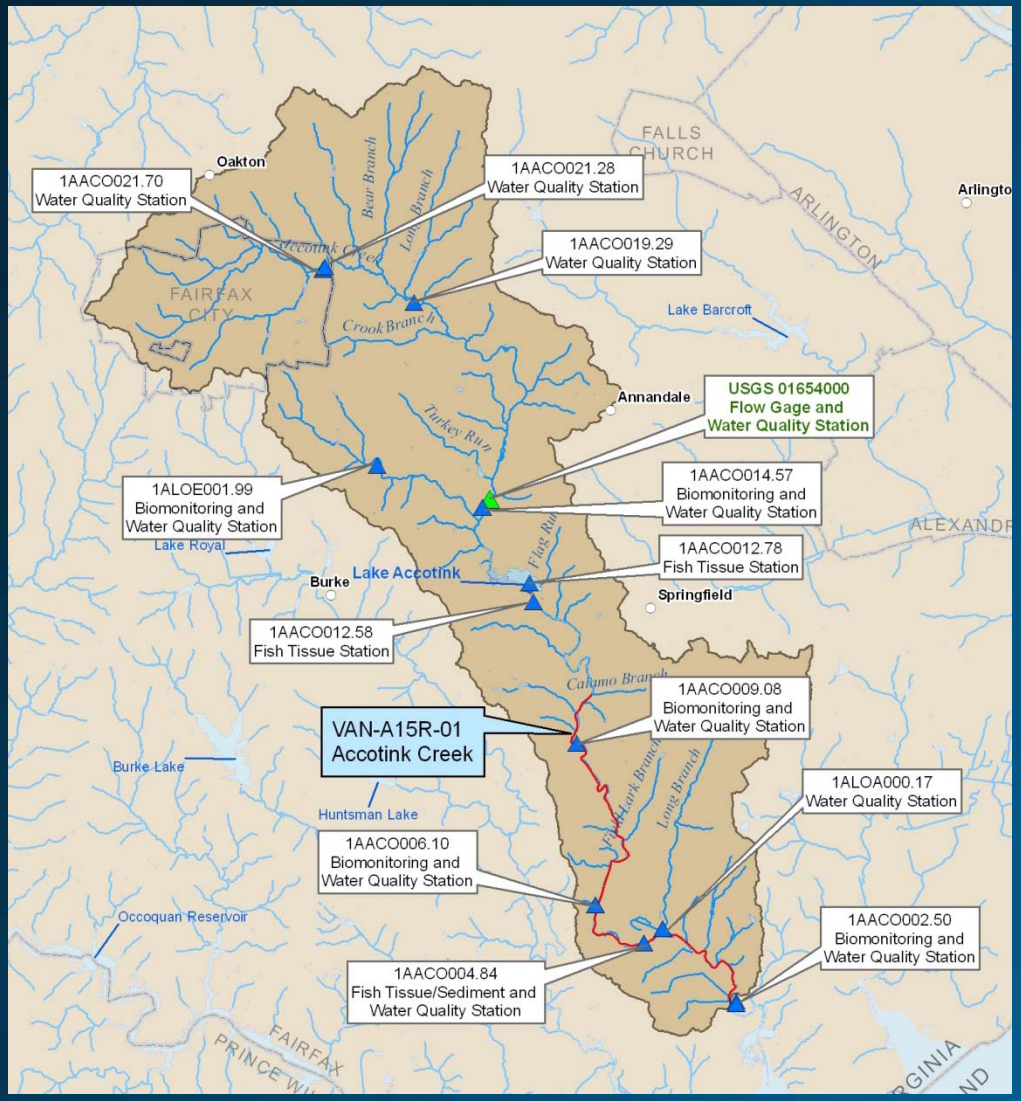
Accotink Creek Benthic Impairment



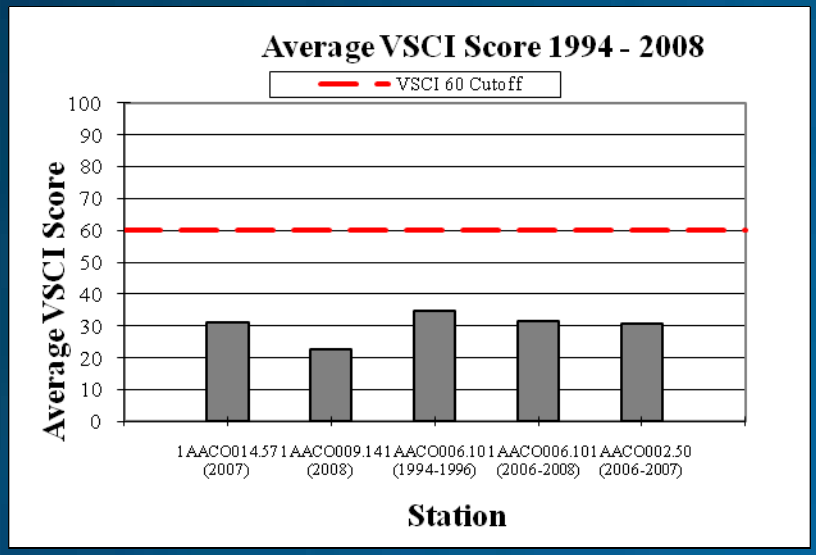
TMDL ID: VAN-A15R-01

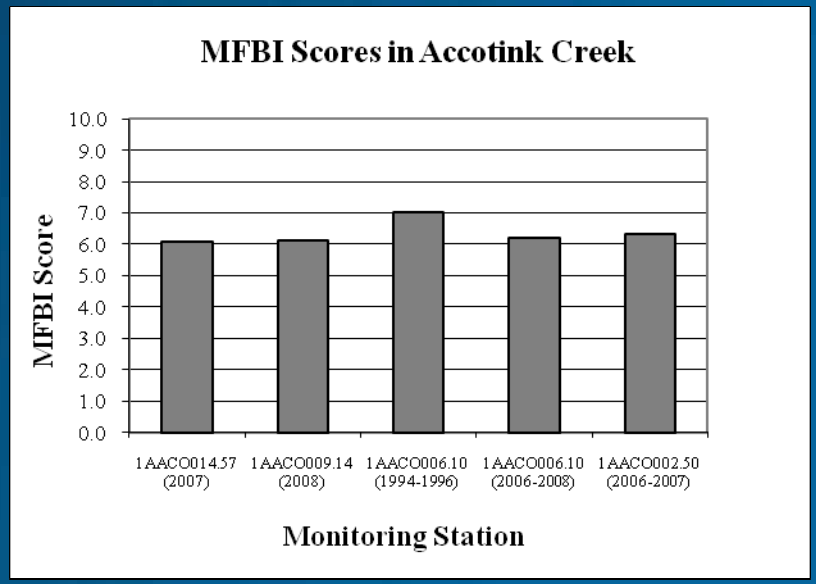
Length 7.35 miles
Benthic Impairment begins at the confluence of Calamo Branch and extends to the to end of free-flowing waters (Rt. 1).

The segment was first listed in 1996 for moderate benthic impairment.

Biological Monitoring

- VSCI scores in the Accotink Creek have been consistently low
  - Overall average of 33.9
  - (1994 – 2008)
- Modified Family Biotic Index (MFBI), adapted from Hilsenhoff's Biotic Index (HBI), remain in the 6-7 range and organism density continues to be low
- Dominant organisms at these stations are from the families Hydropsychidae and Chironomidae (considered to be more tolerant)
- Traditional stressors include:
  - Dissolved Oxygen
  - Nutrients
  - pH
  - Temperature
  - Sediment
  - Toxics





Data Used in Stressor Identification

Environmental Data:

1. Biological and Habitat Assessment Data

a) Collected between 1996 and 2008 at four VA DEQ monitoring stations

2. Water Quality Data

a) Instream water quality data (field parameters, nutrients, solids, metals, and organic contaminants)

- Collected between 1974 and 2008 at eight VA DEQ monitoring stations

3. Toxicity Testing (EPA Region 3 laboratory in Wheeling, West Virginia):

- using water samples from two VA DEQ monitoring stations

a) Acute toxicity testing

b) Chronic toxicity testing

4. Discharge Monitoring Reports (DMR)

5. Biologist's field notes and observations (VA DEQ)

Stressor Identification

Non-Stressors*
pH
Temperature
Dissolved Oxygen
Nutrients (Nitrogen and Phosphorus)
Instream Metals
Possible Stressors**
Toxicity
Metals and Organic Contaminants in Fish Tissue
Most Probable Stressors***
Urban Runoff and Sedimentation (Instream Erosion)

*Non-Stressors - Candidate Stressor without water quality exceedences
**Possible Stressors - Candidate Stressor with data indicating possible links to benthic impairment.
***Most Probable Stressors - Candidate Stressor with conclusive data linking it to the poor health of the benthic community.

Most Probable Stressor

- Most Probable Stressor:
  - *Sedimentation and Urban Runoff (Instream Erosion):* Sedimentation and urban runoff (instream erosion) have been identified as the most probable stressor in the Accotink Creek benthic impaired segment based on the composition of the benthic community and benthic habitat data from the monitoring stations.
    - In particular, low habitat assessment scores for epifaunal substrate, embeddedness, sediment, bank stability, vegetative protection, and riparian zone.
    - DEQ Field Biologists noted impacts from nonpoint source and storm sewer runoff were degrading habitat and potentially inhibiting the health of the aquatic community in the fall of 1994 and spring of 1996.
    - The impervious surfaces within the urban areas have increased the overland flow, high flow events, and channel erosion .
    - Flow frequency analysis (City of Fairfax, July 2005) showed that the frequency of high stream flow events increased and the baseflow decreased with increased imperviousness.

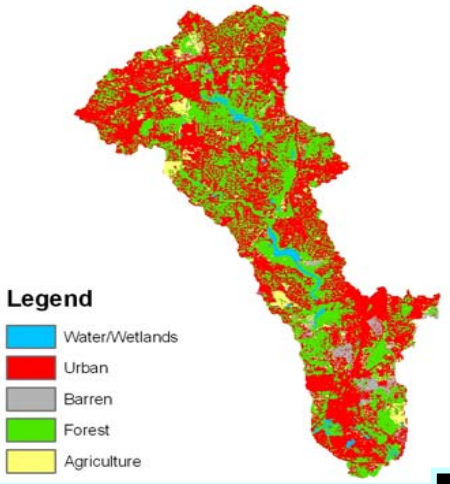
High urban runoff leading to excessive instream erosion are considered to be the most probable stressors impacting the biological community in Accotink Creek.

Technical Approach Development

- Issues to Consider:

1. Highly Urbanized Watershed
2. Based on preliminary analysis more than 80% of sediment is generated within the stream channel

Urbanization in Accotink Creek Watershed

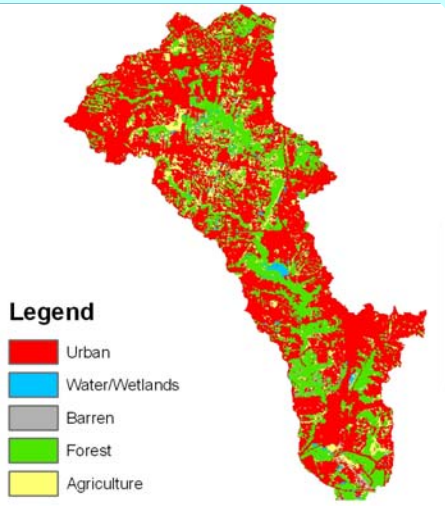


NLCD 1992

Land Cover Type	Acres	% of Watershed
Urban	16,131	52.2%
Water/Wetlands	615	2.0%
Barren	959	3.1%
Forest	11,482	37.2%
Agriculture	1,703	5.5%
Total	30,890	100.0%

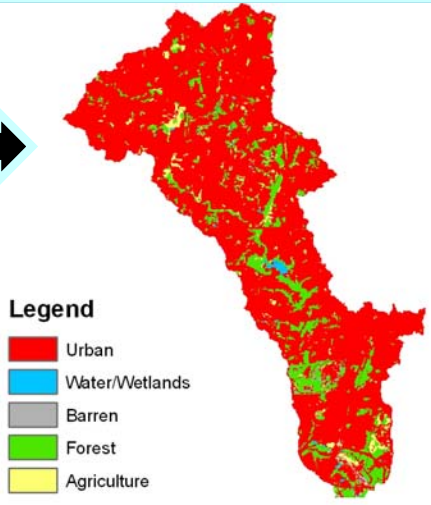
The percent of developed area in Accotink Creek watershed has increased dramatically

from 52% (in 1992)
to 83% (in 2005)



NLCD 2001

Land Cover Type	Acres	% of Watershed
Urban	19,010	61.5%
Water/Wetlands	407	1.3%
Barren	278	0.9%
Forest	8,386	27.1%
Agriculture	2,809	9.1%
Total	30,890	100.0%



NLCD 2001 - DOF 2005 Hybrid

Land Cover Type	Acres	% of Watershed
Urban	25,708	83.2%
Water/Wetlands	172	0.6%
Barren	180	0.6%
Forest	3,768	12.2%
Agriculture	1,061	3.4%
Total	30,890	100.0%

Proposed Technical Approaches

Two Technical Approaches were assessed:

1. Sediment/Flow Load Duration Curves

2. Impervious Cover Model

- based on impervious cover model linked to sediment erosion models and to flow volume

First Approach: Sediment Load Duration Curve Approach Linked to Flow Volume

Use a widely adopted method to:

- develop correlations between stream flow and total suspended sediment (TSS) observations in the impaired segment and non-impaired streams

- Using these relationships, the required reduction of sediment load and stormwater volume can be determined

Second Approach: Impervious Cover Model

- Use the impervious cover (IC) as an indicator of urban watershed degradation
- Establish a relationship between Impervious Cover (IC) and stream health
- Use this relationship to identify the IC endpoint for healthy streams
- Link the IC in Accotink Creek and the IC endpoint to sediments and stormwater flow volume

  - The use of IC as a measure for urban watersheds degradation is not new; Over 200 scientific articles in the last 20 years show that IC is an excellent indicator of development impacts

TMDL Technical Approaches

- Either approach can be used for the development of the benthic TMDL in Accotink Creek

- Both approaches have been used in developing similar TMDLs:
  - Barberry Creek, Maine (Impervious Cover)
  - Eagleville Brook, Connecticut (Impervious Cover)
  - Potash Brook, Vermont (Flow Duration Curve)

- Both approaches are based on good science

Next Steps

- Finalize the Selection of the Technical Approach
- Finalize the Endpoint Estimation
- Develop TMDL Allocations
- Draft TMDL Report

Notice of Intended Regulatory Action (NOIRA)

- State Water Control Board has authority under state law to regulate flow
- Amend Water Quality Management Planning Regulation
- Public comment period is from August 31 thru October 9
- Advisory Panel to broaden TMDL definitions to include flow

NOIRA Posted August 31st

http://www.townhall.state.va.us/L/ViewStage.cfm?stageid=5168

Virginia Regulatory Town Hall

Public Meeting

Regulating Stormwater Flow Through the TMDL Process

Water Quality Management Planning Regulation (9VAC25-720)

Virginia Water Control Board

October 5, 2009

DEQ Central Office

625 E. Main Street, Richmond (VA)

Notice of Intended Regulatory Action (NOIRA)

- Broaden TMDL definitions to regulate flow rate/volume
- Water Quality Management Planning Regulation

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

Project Schedule

Accotink Creek Benthic TMDL	Jun 2009	July 2009	Aug 2009	Sept 2009	Oct 2009	Nov 2009	Dec 2009	Jan 2010	Feb 2010	Mar 2010	Apr 2010
Data Collection and Analysis											
TAC Meeting											
Public Meeting – Introduce the Project											
TMDL Modeling											
TAC Meeting - Present Draft Allocations to TAC											
Prepare Draft TMDL Report											
Public Meeting– Present the Draft TMDL to the Public											
30 Day Comment Period on Draft TMDL											
Response to Comments											
Final TMDL											

Comments? Feedback?

- **Public Comment Period for this meeting extends from September 29, 2009 to October 29, 2009.**
- **All comments should be in writing. Please send them to:**

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